INTRASPECIFIC AGONISTIC INTERACTIONS IN FREELY SWIMMING MORMYRID FISH, *MARCUSENIUS MACROLEPIDOTUS* (SOUTH AFRICAN FORM)

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EXTENDED ABSTRACT ONLY - DO NOT CITE

The bulldog, *Marcusenius macrolepidotus* (Peters, 1852), belongs to the Mormyridae, the most speciose freshwater fish family, endemic to Africa. We studied bulldogs from the extreme southern range for mormyrids, that is, about 27° southern latitude (Incomati River System, South Africa). All mormyrids that have been studied up to now generate brief electric organ discharges (EODs), separated by much longer inter-discharge intervals (IDIs). While the individual EOD waveform in general is highly stereotyped and species-specific, the IDI is highly variable and enables mormyrids to communicate during social interactions (reviews by Kramer 1990, 1996; Moller 1995). Electrocommunication has been studied in only a few of the about 200 mormyrid species. A technical problem still difficult to overcome is the identification of EODs from different conspecific individuals due to their similarity. We used the history of polarity and amplitude of EODs, simultaneously recorded by four pairs of electrodes (fixed to the aquarium walls), in combination with the video-taped position of the fish to assign discharges to specific individuals. We studied overt motor behaviour (videotaped at night using infrared light) and electrical activity in unrestricted moving pairs of fish during nocturnal confrontation tests. Observations on isolated resting and foraging fish were added.

While resting during the day isolated fish showed a broad inter-individual

variability in IDI pattern, with distribution histogram modes ranging from 85.7 ms to 325.8 ms. When foraging during the day, IDI modes were shorter and less variable (36.3 - 48.3 ms).

Fig. 1 shows the electrical activity in a pair of fish (fish C and I), recorded before fighting started. The fish closely passed each other several times but no overt aggression was observed at this time. Note the smooth fluctuation of IDI, ranging from 18.0 ms to 100.3 ms. The distribution histogram mode during nocturnal non-agonistic interactions, such as shown here, was 30.0 ms.

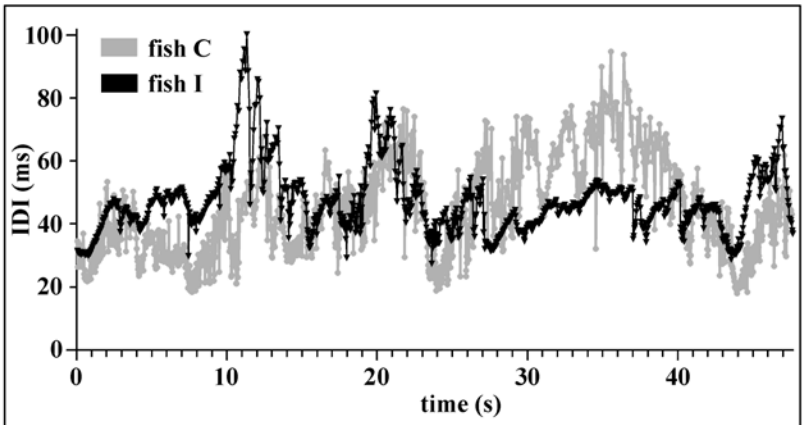

Figure 1. Non-agonistic interaction

Overt motor behaviour patterns displayed during nocturnal agonistic encounters were retreating, parallel swimming, anti-parallel display, attack and fleeing/chasing. During several high intensity agonistic interactions high discharge rate (HD) displays were observed, characteristically alternating with low rate inter-HD activity almost without transition. IDI durations as short as 11 ms occurred during HD displays. Distribution histogram modes when fish showed antiparallel display were 15.4 ms and 24.8 ms. IDIs as short as 15.4 ms were not observed in a non-agonistic context.

Fig. 2 shows a sequence of overt motor behaviour and electrical activity recorded after the fish had started fighting. Fish I (black) attacked fish C (grey) at 0.7 s (image B). From about 4 s on fish I maintained its position as if performing antiparallel display (F, G). Fish C did not join this display but slowly turned around

and finally attacked fish I at 5.7 s (G, H). During the subsequent period of parallel swimming (I) EODs could no longer be assigned to individuals (due to similar position relative to recording electrodes). Note the contrasting pattern of HD displays and low rate inter-HD activity, with IDIs ranging from 11.7 ms to 1141,1 ms.

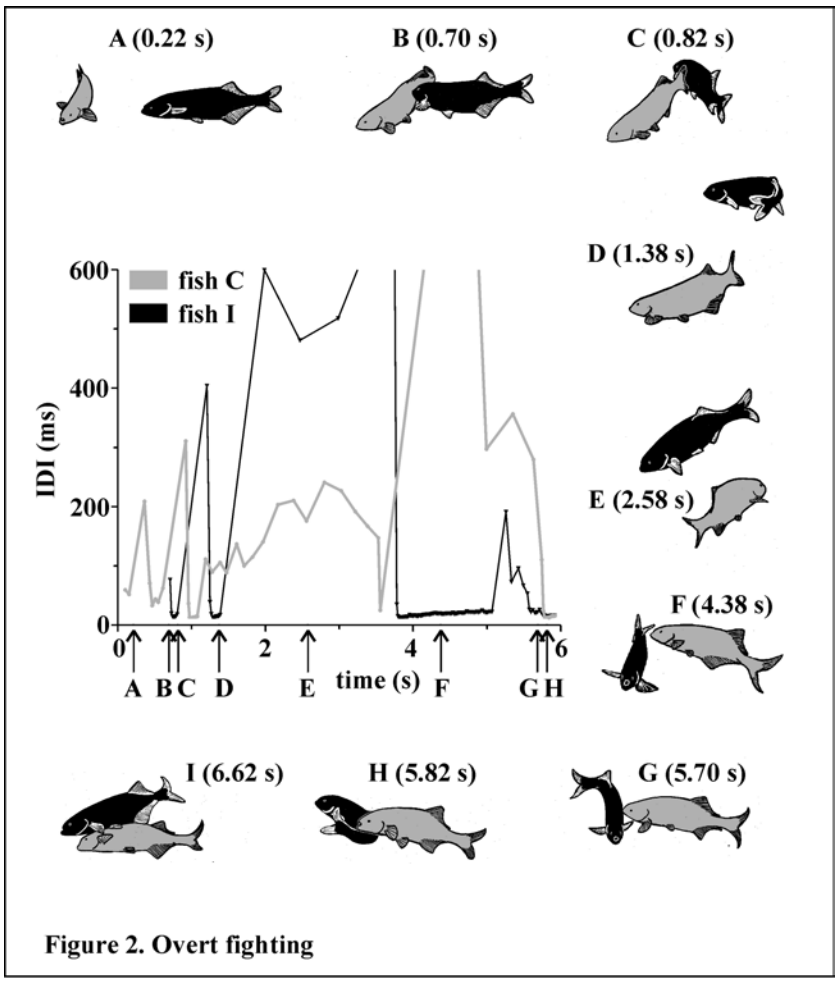

Figure 2. Overt fighting

A possible reason for fighting may be the establishment of a dominance hierarchy for territory ownership. HD displays did not simply follow from increased overt motor activity since they also occurred during periods of relatively low overt motor activity (antiparallel display). An increased need for active electrolocation information during close interaction seems an unlikely explanation since the HD displays characteristically alternated with periods of very low discharge rate. Therefore a communication function for the HD display is proposed. In the dark when visual communication is limited the presentation of a long-duration HD display could signal power and strength. However, it is unknown whether the ability to give a prolonged HD display is directly correlated with physical strength in *Marcusenius macrolepidotus*.

For a full account see Werneyer & Kramer (in press).

References

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